REMARKS

The following remarks are fully and completely responsive to the Office Action dated September 11, 2002. Claims 1-11 are pending in this application. In the outstanding Office Action, the drawings were objected to under 37 C.F.R. § 1.83(a); claims 2-6 were rejected under 35 U.S.C. § 112, first paragraph; claims 1-11 were rejected under 35 U.S.C. § 112, second paragraph; and claims 1-11 were rejected under 35 U.S.C. § 103(a) (three different rejections). No new matter has been added. Claims 1-11 are presented for reconsideration.

Drawings

The drawings were objected to under 37 C.F.R. § 1.83(a). The Office Action asserted that the drawings fail to show each and every feature of the invention specified in the claims. Specifically, the Office Action asserted that the feedback control disclosed in claim 4 was not shown in the drawings. A feedback signal of the output voltage back to the control section 11 is illustrated in Figures 4 and 6. Figure 5 illustrates the feedback control processes carried out in the embodiment shown in Figure 4 and Figure 7 illustrates the feedback control processes carried out in the embodiment shown in Figure 6. Accordingly, examples of the feedback control recited in claim 4 is shown in the drawings. Accordingly, applicants request reconsideration and withdrawal of the objection to the drawings under 37 C.F.R. § 1.83(a).

35 U.S.C. § 112, first paragraph

Claims 2-6 were rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Applicant respectfully requests reconsideration of this rejection.

Claims 2 and 3 have been amended to clarify these claims without narrowing the scope of these claims.

The Office Action questions how the power can increase when the voltage decreases. The Office Action correctly states that Power = $(\text{Voltage})^2/\text{Resistance}$. However, the following are also true:

Power = Voltage X Current; and

Power = $(\text{Current})^2$ X Resistance.

Accordingly, the power output by a circuit and/or generator can increase as the voltage decreases so long as the current output increases at a faster rate than the voltage decreases.

Regarding claim 3, an open circuit voltage for a generator is equivalent to placing an infinite load on the generator, since in both cases the current output is zero. In order to clarify this concept, applicants have amended claim 3 to replace "substantially infinite" with "substantially equivalent to an open circuit load resistance." These amendments to claim 3 clarify claim 3 without changing the scope of claim 3.

Claims 2 and 3, as amended, and claims 4-6 which depend, directly or indirectly, from claim 2 contain subject matter which is described in the specification in such a way

as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Accordingly, applicants respectfully request reconsideration and withdrawal of the rejection of claims 2-6 under 35 U.S.C. § 112, first paragraph.

35 U.S.C. § 112, second paragraph

Claims 1-11 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant has amended claims 1-4 and 11 to clarify these claims without narrowing the scope of these claims. Accordingly, claims 1-11 particularly point out and distinctly claim the subject matter which applicant regards as the invention. Therefore, applicant respectfully requests reconsideration and withdrawal of the rejection of claims 1-11 under 35 U.S.C. § 112, second paragraph.

35 U.S.C. § 103(a)

Claims 1 and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Iwatani (Patent No. 5,061,889) in view of Liang (U.S. Patent No. 5,793,167). In making this rejection, the Office Action asserts that the combination of these two references teach each and every element of the claimed invention. The Office Action also asserts that one of ordinary skill in the art would combine these two references. Applicant respectfully requests reconsideration of this rejection.

Claim 1 recites an electric power supply system including an AC generator for generating a power to supply the power to a load. A controlling means controls the AC

generator so that the AC generator operates in a current range where an output current is lower than a maximum power output current corresponding to a maximum power operating point of the AC generator.

Iwatani discloses a vehicle AC generator control device for adjusting output voltage in accordance with vehicle conditions. This device includes an alternator 1 that outputs an alternating current to rectifier 2. Control circuits 3 and 9 control the field current of field coil 102 to control the output of alternator 1. A DC-DC converter 10 is used to double the output voltage from 12 volts DC to 24 volts DC when the engine is operating at speeds below 1500 rpm. This change in the voltage to the field coil 102 causes the output from the generator to approximately double. Accordingly, an alternator with this control system can provide sufficient output power to meet the electrical needs of a vehicle, even with the lights on and operating at a low speed, for example, when in a traffic jam.

The Office Action admits that Iwatani does not explicitly disclose a control means. The Office Action cites Liang as curing this deficiency in Iwatani.

Liang discloses a method for operating a motor vehicle alternator. This method uses a microprocessor 124 and a field current control 148 and a controlled rectifier bridge having controlled switches to control both the field current provided to the alternator and the phase angle between the phase voltages at the three output connections of the alternator's stator winding and the third harmonic. To increase the power output from the alternator 116, the field current is first increased up to a maximum field current. Thereafter, a phase angle is introduced between the phase voltages and the third harmonic.

While both Liang and Iwatani disclose alternator control systems, neither Iwatani nor Liang teach and/or suggest a controlling means that performs the function recited in claim 1. Specifically, neither of these two references teach and/or suggest controlling the AC generator so that the AC generator operates in a current range where an output current is lower than a maximum power output current. The maximum power output current corresponding to a maximum power operating point of the AC generator. Since neither of these two references, either in combination or individually, teach and/or suggest the claimed invention, applicants respectfully request reconsideration and withdrawal of the rejection of claims 1 and 7 under 35 U.S.C. § 103(a).

Claims 2-6 and 8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Iwatani and Liang (both discussed above) and further in view of Clark (U.S. Patent No. 4,827,393). In making this rejection, the Office Action asserts that the combination of these three references teach and/or suggest each and every element of the claimed invention. The Office Action also asserts that it would be obvious to one of ordinary skill in the art to combine these three references. Applicants request reconsideration of this rejection.

The Office Action admits that the combination of Iwatani and Liang fails to disclose and/or suggest using pulse width modulation. The Office Action cites Clark as correcting this deficiency in the combination of Iwatani and Liang.

Clark teaches an alternator and regulator for use with the alternator. The regulator contains electronic circuitry which allows the voltage at the alternator to rise while limiting the current through the alternator by use of pulse-width modulation.

While Clark discloses regulating the output of an alternator using pulse-width modulation, Clark fails to disclose and/or suggest controlling the alternator or AC generator so that the AC generator or alternator operates in a current range where an output current is lower than a maximum power output current corresponding to a maximum power operating point of the AC generator. Therefore, Clark fails to correct the deficiencies discussed above in the combination of Iwatani and Liang.

Accordingly, the combination of these three references fails to disclose and/or suggest the claimed invention. Specifically, the combination of these three references fails to disclose controlling the AC generator so that the AC generator operates in a current range where an output current is lower than a maximum power output current corresponding to a maximum power operating point of the AC generator. Therefore, applicants respectfully request reconsideration and withdrawal of the rejection of claims 2-6 and 8 under 35 U.S.C. § 103(a).

Claims 9-11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Iwatani, Liang, and Clark (discussed above) and further in view of Brkovic (U.S. Patent No. 5,642,267). In making this rejection, the Office Action asserts that the combination of these four references teach and/or suggest each and every element of the claimed invention. The Office Action also asserts that one of ordinary skill in the art would combine these four references. Applicant respectfully requests reconsideration of this rejection.

The Office Action admits that the combination of Iwatani, Liang, and Clark fails to disclose and/or suggest using the switch recited in claim 9 and the sensor recited in

claim 10. The Office Action cites Brkovic as correctly this deficiency in the combination of Iwatani, Liang, and Clark.

Brkovic discloses a single stage, unity power factor switching converter with voltage bidirectional switching switch and fast output regulation. The DC to DC converter disclosed in this references utilizes switch S1 and transistor Q1 in order to provide for unity power factor operation. Brkovic, in Fig. 1 designated as prior art, indicates providing the output of a current sensor to a first DC to DC converter. Brkovic, however, fails to teach and/or disclose controlling the AC generator so that the AC generator operates in a current range where an output current is lower than a maximum power output current corresponding to a maximum power operating point of the AC generator.

The combination of these four references fails to teach and/or suggest the recited invention. Specifically, the combination of these four references fails to teach and/or suggest controlling the AC generator so that the AC generator operates in a current range where an output current is lower than a maximum power output current corresponding to a maximum power operating point of the AC generator. Accordingly, applicant respectfully requests reconsideration and withdrawal of the rejection of claims 9-11 under 35 U.S.C. 103(a).

Conclusion

Applicant's amendments and remarks have overcome the objections and rejections set forth in the Office Action dated September 11, 2002. Specifically, applicant's remarks have identified that every feature of the invention specified in the

claims is shown in the drawings. Applicant's remarks have illustrated how the subject matter recited in claims 2-6 is described in the specification in such a way as to enable one skilled in the art to which it pertains or with which it is most nearly connected, to make and/or use the invention, thus overcoming the rejection of these claims under 35 U.S.C. § 112, first paragraph. Applicant's amendments and remarks have illustrated that claims 1-11 particularly point and distinctly claim the subject matter which applicant regards as the invention and thus overcome the rejection of these claims under 35 U.S.C. § 112, second paragraph. Applicant's remarks have distinguished claims 1-11 from the cited prior art and thus overcome the rejections of these claims under 35 U.S.C. § 103(a) (three different rejections). Claims 1-11 are therefore in condition for allowance. Accordingly, applicants respectfully request consideration and allowance of claims 1-11.

Applicant submits the application is now in condition for allowance. If the Examiner believes the application is not in condition for allowance, applicant respectfully requests the Examiner contact the undersigned attorney by telephone, if it is believed that such contact will expedite the prosecution of the application.

The Commissioner is authorized to charge payment for any additional fees which may be required with respect to this paper to Deposit Account No. 01-2300, making reference to Attorney Docket No. 107355-00005.

Respectfully submitted,

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MARKED-UP COPY OF AMENDED CLAIMS
AS REQUIRED UNDER 37 C.F.R. § 1.121

1. (Amended) An electric power supply system comprising;

an AC generator for generating a power to supply the power to a load; and

controlling means for [disposed between said AC generator and said load, wherein said] controlling said AC generator so that [means performs a control so that] said AC generator [operators] operates in a current range where an output current [which] is lower [in level] than [an] a maximum power output current corresponding to a maximum power operating point of said AC generator.

2. (Amended) The electric power supply system according to claim 1, wherein said AC generator has [drooping] an operating characteristic in which, [as said load is increased,] an output power [is increased corresponding to a decrease of an] increases as an output voltage[, and] decreases until said output power is maximum at said maximum power operating point, and said output power decreases as [is decreased corresponding to the further decrease of] said output voltage further decreases.

3. (Amended) The electric power supply system according to claim 2, wherein said controlling means performs a control so that a load resistance of said AC generator starts from an initial state, in which the load resistance is substantially equivalent to an open circuit load resistance [substantially infinite], and thereafter the load resistance is reduced [with a passage of] over time.

4. (Amended) The electric power supply system according to claim 1, wherein said controlling means comprises:

rectifying means for rectifying an output of said AC generator; and

DC voltage converting means for lowering an output voltage of said rectifying means and supplying said output voltage to said load, and for performing [performs] a feedback control so that an output voltage of said DC voltage converting means coincides with a target voltage.

5. (Amended) The electric power supply system according to claim 2, wherein said controlling means comprises:

rectifying means for rectifying an output of said AC generator; and

DC voltage converting means for lowering an output voltage of said rectifying means and supplying said output voltage to said load, and for performing [performs] a feedback control so that an output voltage of said voltage converting means coincides with a target voltage.

6. (Amended) The electric power supply system according to claim 3, wherein said controlling means comprises:

rectifying means for rectifying an output of said AC generator; and

DC voltage converting means for lowering an output voltage of said rectifying means and supplying said output voltage to said load, and for performing [performs] a feedback control so that an output voltage of said voltage converting means coincides with a target voltage.

11. (Twice Amended) The electric power supply system according to claim 9, wherein said control section controls said switching element by means of a [PWM] pulse width modulation control.